STATE OF UTAH
DEPARTMENT OF NATURAL RESOURCES
UTAH GEOLOGICAL AND MINERAL SURVEY

MAP 74

GEOLOGIC MAP OF ARCHES NATIONAL PARK AND VICINITY, GRAND COUNTY, UTAH

1985

By Hellmut H. Doelling

Klaus D. Gurgel, Cartographic Editor
Kent D. Brown, Cartographer

Scale 1:50,000
1 inch equals approximately .8 mile
Contour intervals 40 feet and 80 feet

1 0 0 1 2 3
meters 1000 500 0 1 2 3 4 5 kilo
KILOMETERS

Base from U.S. Geological Survey Arches National Park, 1:50,000, 1974; topographic quadrangles: Crescent Junction, 1958; Thompson, 1958; Cisco, 1958; Castle Valley, 1964.

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EXPLANATION

- Of — Man-made fill.
- Qa1 — Alluvium—*Clay, silt, sand and gravel deposits along the more important active rivers, streams and washes.*
- Qa2 — Alluvium and older alluvium, mixed with varying amounts of colluvial, lacustrine, and aeolian deposits—*Mostly sand, but contains considerable gravel, silt, and clay. Interbedded volcanic ashes dated at 620,000 and 740,000 years before present.*
- Qag — Gravel deposits of mostly alluvial origin—*Larger mappable areas.*
- Qat — Terrace gravel deposits located along the Colorado River and its more important tributaries—*These deposits have mostly been transported to the depositional site from a considerable distance and are locally auriferous.*
- Qeas — Sand deposits—*Mostly of aeolian origin, mixed or interlayered with various amounts of alluvial, eluvial, and colluvial sand.*
- Qes — Aeolian sand deposits-*In dunes or sheets.*
- Qms — Landslide deposits—*Mostly larger coherent to partly broken up masses of consolidated units that have moved downslope a considerable distance.*
- Qmt — Talus deposits—*Mostly rockfall blocks, boulders, and smaller angular fragments lying on slopes immediately below the parent outcrop. Mapped only where they completely cover the units beneath.*

CENOZOIC ERA — QUATERNARY

- Kmu / Kms — Upper Mancos Shale—*Light to dark gray marine shale, slope-former, containing occasional sandy beds (Kms) which are slightly more resistant. Locally fossiliferous. Youngest consolidated unit found involved in dissolution collapse along Salt Valley anticline. Incompletely exposed in mapped area, thickness 500+ ft.*
- Kmf — Ferron Sandstone Member of Mancos Shale—*Thin-bedded sandstone, sandy shale, marine shale, carbonaceous shale, forms a double cuesta, being more resistant than Mancos Shale members above and below. The member can be subdivided into three units—upper and lower sandy units which are brown gray to yellow gray and fossiliferous and a medial dark shale unit, which is locally coaly. Thickness 60 to 120 ft.*
- Kml — Lower Mancos Shale—*Light to dark gray marine shale, slope-former containing occasional sandy beds, especially near the top. The sandy beds are slightly more resistant and have yellow gray to brown gray color. Thickness 300 to 500 ft.*
- Kd — Dakota Sandstone—*Sandstone, conglomeratic sandstone, conglomerate, with subordinate gray sandy shale, carbonaceous shale, and marl beds. Thin and discontinuous to the west, it forms well marked dip slopes on the northeast flank of the Salt Valley anticline. Thickness 0 to 110 ft.*

Unconformity

- Kcm / Kdcm — Cedar Mountain Formation—*Silty variegated nonresistant mudstones interbedded with ledgeforming quartzites, conglomerates, and gritstones. Mudstones are mostly light green, gray, lavender and white. Kdcm indicates areas of undifferentiated Cedar Mountain Formation and Dakota Sandstone. Cedar Mountain Formation thickness is 100 to 250 ft.*

CRETACEOUS — Mancos Shale

Unconformity

- Jmbb — Brushy Basin Member of Morrison Formation—*Mostly variegated slope-forming mudstone with thin ledges of conglomeratic sandstone, conglomerate, nodular weathering limestone, and gritstone, containing varicolored chert. These ledge-formers are more abundant near the base of the unit. Purplish and lavender hues dominate to the north, but bright greens dominate in Cache Valley and the southern part of Salt Valley anticline. Thickness 300 to 450 ft.*
- Jmsw — Salt Wash Member of Morrison Formation—*Light yellow gray crossbedded lenticular sandstone interbedded with red and gray mudstone and siltstone. Some conglomeratic sandstone, gritstone and thin limestone beds are also present. The thickest sandstone beds are often mineralized with vanadium-uranium (Yellow Cat area), or with copper (northern part of SW flank, Salt Valley anticline). Thickness 130 to 300 ft.*
- Jmt — Tidwell Member of Morrison Formation—*Reddish silty shale, with interbeds of fine-grained yellow sandstone and gray limestone. Eastern exposures exhibit large white siliceous concretionary bodies. This excellent marker bed was formerly known as the Summerville Formation, but shown by O'Sullivan (1980) to be a lower member of the Morrison Formation. Thickness 40 to 100 ft.*

Unconformity

- Jem — Moab Tongue of Entrada Sandstone—*Light yellow gray fine- to medium-grained resistant and massive sandstone, forming an impressive barerock dip-slope on both flanks of the Salt Valley anticline. Exposures to northwest have a slope and ledge-forming unit beneath the main cliff of medium-grained sandstone up to 25 ft thick. Thickness of entire unit is variable, 60 to 120 ft.*
- Je — "Slickrock" or Main Body of Entrada Sandstone—*Mostly orange-red fine-grained sandstone, massive, often covered with self-derived sand. Not as resistant as Moab Tongue above, but more resistant than Dewey Bridge Member below. Thickness 200 to 500 ft.*
- Jed — Dewey Bridge Member of Entrada Sandstone—*Dark reddish fine-grained silty sandstone, with occasional white bands. Exhibits contorted bedding which often affects the lower part of the "Slickrock" Member above. Formerly known as the Carmel Formation. Thickness 40 to 235 ft.*

Unconformity

- JTrn — Navajo Sandstone—*Mostly massive light-hued aeolian sandstone, cropping out as vertical cliffs in deep canyons and as domes and rounded knolls elsewhere. Contains local thin, hard, gray carbonate beds. Thickness in outcrop 250 to 550 ft.*
- Trk — Kayenta Formation—*Mostly sandstone of lavender-gray color with local white and dark brown beds. Some beds are micaceous and there are occasional intraformational conglomerates. Forms thick step-like ledges between the more massive Navajo and Wingate Formations. Thickness in outcrop 200 to 300 ft.*
- Trw — Wingate Sandstone—*Massive fine-grained, well-sorted sandstone, usually forming a dark brown cliff in outcrop. Where shattered by salt tectonics forms a fine-terraced orange or orange-brown cliff. Thickness in outcrop 250 to 450 ft.*
- Trc — Chinle Formation—*Mostly reddish-brown silty fine-grained sandstone, forming slopes, interbedded with considerable mudstone and some gritty beds. Toward the base is a member of poorly cemented gritstone, conglomerate, mottled gritty siltstone and mudstone which is quite variable in thickness. Upper part exhibits local angular unconformities. Lower member is often mineralized with uranium and copper. Thickness in outcrop varies from 200 to 900 ft.*

Unconformity

- Trm — Moenkopi Formation—*Brown, evenly-bedded sandy shale and micaceous silty sandstone forming smooth slopes interrupted by occasional thin ledges. Sandstones are often ripple marked. Thickness 0 to 1300 ft.*

Unconformity

- Pc — Cutler Formation—*Red and maroon crossbedded sandstones and conglomerates with subordinate sandy shales. Lower part contains thin fossiliferous limestone beds. Thickness 0 to 1500 ft.*

Unconformity

- Php — Pennsylvanian rocks—*Non-gypsiferous rocks Mostly Honaker Trail Formation outcrops, but may include some non-gypsiferous Paradox Formation outcrops at some Salt Valley locations. Mostly limestones, shales, sandstones, and arkosic sandstones. Limestones are often fossiliferous. In mid-valley knolls the outcrops are highly deformed and faulted consisting of poor exposures of mostly sandstone and sandy limestone chips. Maximum thickness of exposures is 300+ ft.*
- Ppg — Paradox Formation gypsiferous exposures—*Mostly contorted gypsum with interbeds of black shale, thin chippy limestone and sandstone. Surface thicknesses probably do not exceed 500+ ft.*

PENNSYLVANIAN — PERMIAN — TRIASSIC — JURASSIC — MESOZOIC ERA — PALEOZOIC ERA

Morrison Formation — San Rafael Group — Glen Canyon Group

- LITHOLOGIC CONTACT
- FAULT — *Approximate trace of fault at surface, dotted where concealed, bar and ball on downthrown side.*
- STRIKE AND DIP OF INCLINED BEDS
- ANTICLINE / SYNCLINE — *Approximate trace of anticlinal or synclinal axis and direction of plunge. These folds are thought to be formed during Early Tertiary compressional event. Dotted where concealed.*
- ANTICLINE / SYNCLINE — *Approximate trace of anticlinal or synclinal axis and direction of plunge. Most of these folds are due to salt tectonics, either through collapse by dissolution of salt, or by salt movement. Dotted where concealed.*
- ARCHES NATIONAL PARK BOUNDARY
- MINE TAILINGS

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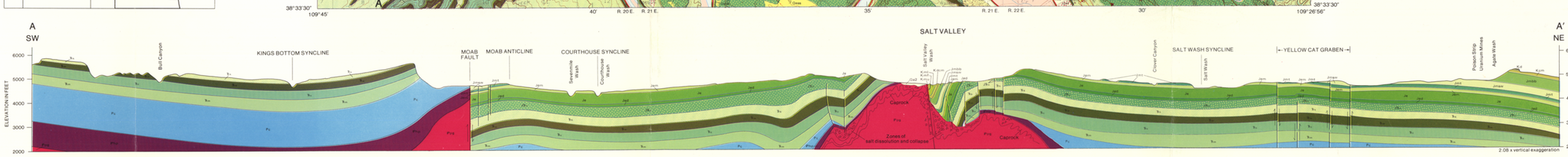
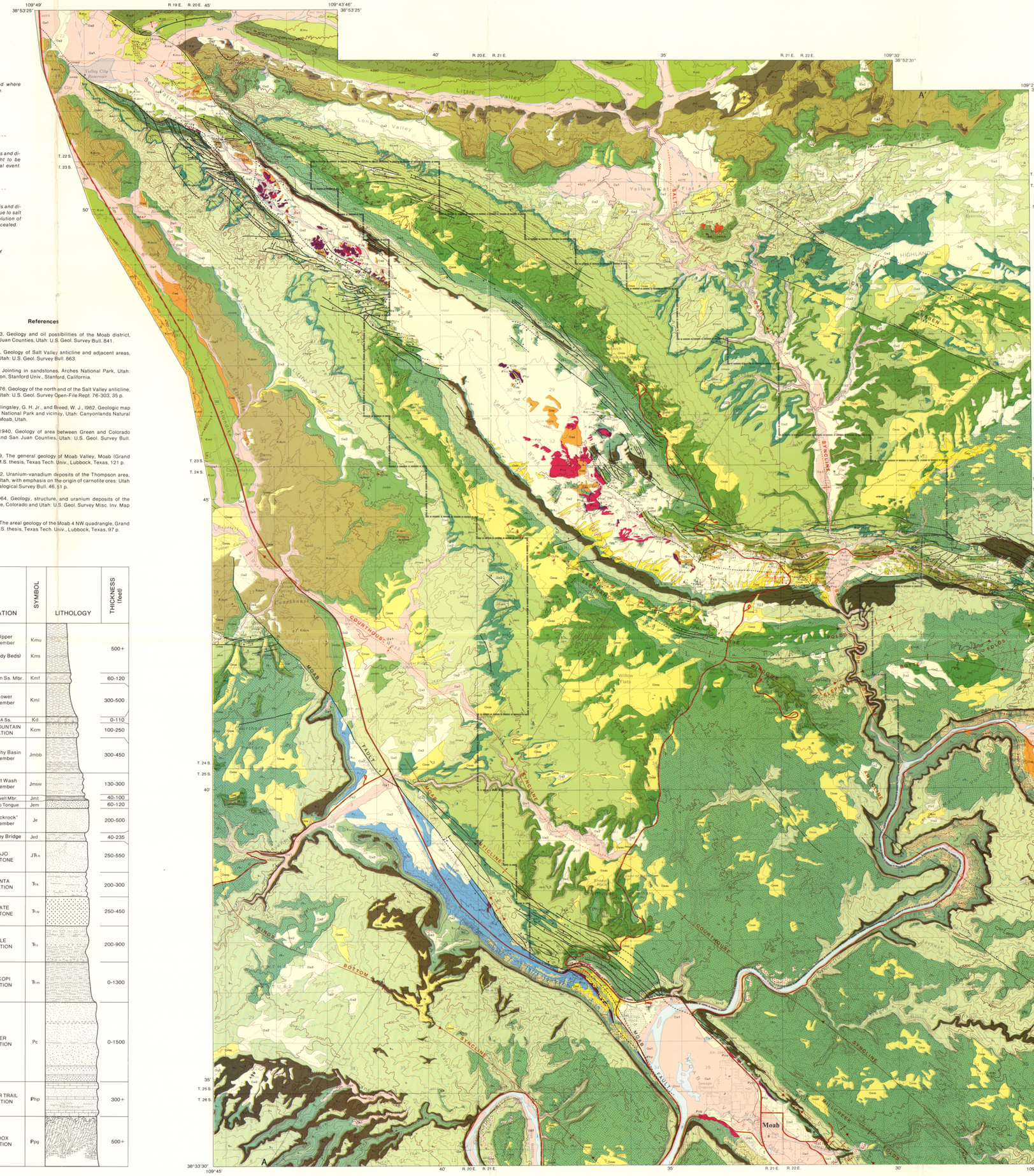
SYSTEM	FORMATION		SYMBOL	LITHOLOGY	THICKNESS (feet)
CRETACEOUS	MANCOS SHALE	Upper Member	Kmu		500+
		(Sandy Beds)	Kms		
		Ferron Ss. Mbr.	Kmf		60-120
		Lower Member	Kml		300-500
	DAKOTA Ss.		Kd		0-110
	CEDAR MOUNTAIN FORMATION		Kcm		100-250
JURASSIC	MORRISON FORMATION	Brushy Basin Member	Jmbb		300-450
		Salt Wash Member	Jmsw		130-300
		Tidwell Mbr.	Jmt		40-100
	ENTRADA SANDSTONE	Moab Tongue	Jem		60-120
		"Slickrock" Member	Je		200-500
		Dewey Bridge	Jed		40-235
	NAVAJO SANDSTONE		JTrn		250-550
TRIASSIC	KAYENTA FORMATION		Trk		200-300
	WINGATE SANDSTONE		Trw		250-450
	CHINLE FORMATION		Trc		200-900
	MOENKOPI FORMATION		Trm		0-1300
PERMIAN	CUTLER FORMATION		Pc		0-1500
PENNSYLVANIAN	HONAKER TRAIL FORMATION		Php		300+
	PARADOX FORMATION		Ppg		500+





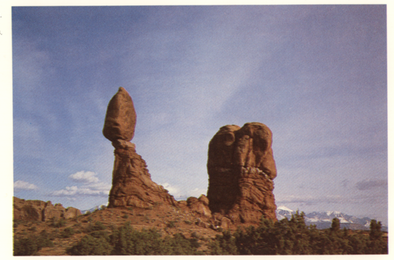


Figure 1. *Balanced Rock is a well-known and central landmark in Arches National Park. The Balanced Rock consists of the Slickrock Member resting on the narrow pedestal of the Dewey Bridge Member of the Entrada Sandstone. Balanced Rock rests on the Navajo Sandstone. The La Sal Mountains form a beautiful backdrop to many of the park features.*

Figure 2. *Aerial view of Delicate Arch. Delicate Arch is the park's trademark and is formed at the contact of the Slickrock and Moab Members of the Entrada Sandstone.*

LOCATION MAP

Approximate mean declination, 1974